

REMARKS

Claims 1-29 are pending in the application. Claims 1-15 have been examined on the merits and claims 16-29 have been withdrawn

Specification Objection

The Examiner objects to the title as not being descriptive. Applicants have amended the title in a manner believed to overcome the objection.

Claim Rejections

Claims 1-5, 13 and 15 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Fujita (JP 2000-164322).

Applicants respectfully traverse this rejection.

Claim 1 sets forth four basic steps for making a spark plug. First, the ground electrode is provisionally pressed toward the center electrode. Then, adjustment bending bends the ground electrode in the widthwise direction to eliminate the eccentricity. This adjustment bending is in the widthwise direction, while the provisional pressing is in a direction toward the center electrode. Finally, the spark gap (g1) and the difference between the measured spark gap (g1) and the final target gap (gt) is determined, and if the difference (g1-gt) is positive, the ground electrode is again pressed toward the center electrode.

The present application recognizes that adjustment bending in the width direction, may still have an effect on the spark gap (*see* page 2, lines 12-22). Therefore, in claim 1, a measurement and possible final pressing is performed after adjustment bending in the width direction, so that any effect that the adjustment bending had on the spark gap has already occurred when the final pressing is determined.

Fujita at least fails to disclose adjustment bending in the widthwise direction or the particular pressing and bending steps set forth in claim 1. Fujita is directed to only two depressions, a test depression and an adjustment depression. Also, both depressions are in the direction of a center electrode toward a center electrode, neither is in a widthwise direction (*see, for example, Drawing 16*).

Fujita teaches that after the ground electrode is depressed it springs back a certain amount. Fujita also teaches that the spring back is unique to each electrode (*see abstract, “[t]he second SB [spring back] quantity u2’ is a value peculiar to each processed spark plug”*). Therefore, Fujita teaches a first test depression to depress the ground electrode to less than a final position. The spring back for the test depression is measured for use in estimating the spring back that will occur in the adjustment depression. Since the spring back for the adjustment depression can be estimated, the adjustment depression depresses the ground electrode a sufficient amount to create the correct gap after spring back.

In view of the above, claim 1 is allowable over Fujita at least because Fujita fails to teach any widthwise adjustment and because Fujita fails to teach the specific pressing, bending and measuring steps as set forth in claim 1. First, both the test depression and the adjustment depression depress the ground electrode in a direction toward the center electrode (*see Fujita Drawing 16 and claim 1*). Neither is in a widthwise direction so as to eliminate an eccentricity as set forth in claim 1. Besides the description of the depression as depressing the ground electrode toward the center electrode, it is also clear that Fujita teaches depression of the ground electrode toward the center electrode because Fujita is concerned with the spark gap. The spark gap is decreased by depression of the ground electrode toward to the center electrode. Adjustment in

the width direction affects eccentricity. Accordingly, Fujita is deficient at least because it fails to teach adjustment in the width direction.

Fujita also fails to teach the specific pressing and bending of claim 1. Claim 1 sets forth provisionally pressing the ground electrode toward the center electrode, adjustment bending the ground electrode in the widthwise direction and then, dependent upon a measurement of the gap, possibly pressing the ground electrode toward the center electrode again. As stated before, Fujita does not have the adjustment bending at all. Also, Fujita teaches that the test depression depresses to less than a final position and thus also has an adjustment depression. In claim 1, the provisional pressing also depresses to less than a final position, but because there is also a widthwise adjustment bending, the gap is measured to see if another pressing of the ground electrode toward the center electrode is necessary. In Fujita, a second pressing of the ground electrode toward the center electrode is always necessary, so it does not teach this feature of claim 1.

Claims 2-5 and 13 depend from claim 1. Applicants therefore submit that claims 2-5 and 13 are allowable at least because of their dependency.

Claim 15 sets forth a method of performing adjustment bending of spark plugs in the width direction. As explained above, Fujita fails to teach adjustment bending in the width direction at all, and therefore certainly does not teach the particular adjustment bending method of claim 15.

For at least the above reasons, Applicants respectfully submit that claims 1-5, 13 and 15 are not anticipated by Fujita and withdrawal of the rejection under 35 U.S.C. § 102(b) is respectfully requested.

Claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujita. Applicants respectfully traverse this rejection for the following reasons. The Examiner asserts that Fujita discloses all of the elements of claim 6 except for using a least square regression formula, that adjusting any function to a linear function by a least square regression of the data sets is well known in the art, and that it would have been obvious to do so in order to provide a linear function. Applicants respectfully traverse.

Claim 6 depends from claim 1. Even if, for the sake of argument alone, it would have been obvious to modify Fujita as suggested by the Examiner, Fujita would still be deficient with respect to claim 1, and thus dependent claim 6, for at least the reasons outlined above.

Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claim 6 as being unpatentable over Fujita.

Claims 7-12 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujita in view of Nakatani et al. (U.S. Patent No. 5,741,963). Applicants respectfully traverse this rejection at least because one of ordinary skill in the art would not have been motivated to modify Fujita with Nakatani as suggested by the Examiner and any combination would be deficient.

Claims 7-12 and 14 depend from claim 1. The Examiner acknowledges that Fujita is deficient with respect to several features of claims 7-12 and 14, including obtaining an initial approximation function and performing the bending process based on a eccentricity to a final target deviation, but that these deficiencies can be corrected by Nakatani. However, Fujita is deficient with respect to more than the features acknowledged by the Examiner. Although Nakatani teaches adjustment in the width direction to eliminate eccentricity, it does not teach the

doing so in the particular bending and pressing steps as claimed and therefore fails to correct the deficiencies of Fujita with respect to these features. Additionally, one of ordinary skill in the art would not have been motivated to modify Fujita with Nakatani for the reasons discussed below.

First, Applicants generally note that, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, or would render the same unsatisfactory for its intended purpose, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.¹

In this regard, Fujita teaches that the spring back is peculiar for each individual spark plug (*see abstract*). Fujita also teaches that carrying out a press operation a number of times decreases the efficiency of the gap adjustment (*see paragraph [4]*). Therefore, Fujita teaches a test depression so that the spring back for each individual spark plug can be determined. Because Fujita can estimate the spring back for each spark plug, it only requires two depressions, thus eliminating the inefficiency of having numerous depressions.

Nakatani is substantially different and incompatible with Fujita. Nakatani gathers information about spark plugs which have been manufactured to determine how much impact working to perform on the ground electrode. In fact, the Examiner states that Nakatani teaches obtaining an initial approximation function prior to beginning the manufacture of the spark plug in the abstract and at column 4, lines 50 to column 5, line 17 (*see Office Action item 12, page 5*). This is in contrast to Fujita, which uses data obtained in working a particular spark plug (from performing the test depression) in further working the same spark plug (performing the

¹ *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). See also MPEP § 2143.01.

adjustment depression) in order to eliminate problems due to differences between each spark plug. Since Fujita teaches that the properties of each spark plug are different, one of ordinary skill in the art would not have been motivated to combine Fujita with Nakatani which relies on data from other spark plugs in the manufacturing of a particular spark plug. Such a modification would frustrate one of the purposes of Fujita. Namely, Fujita has eliminated the need to rely on data for other spark plugs in manufacturing a particular spark plug, and the associated problems. The Examiner's proposed modification would reintroduce the very problem that Fujita seeks to avoid.

Furthermore, Fujita teaches that numerous depressions may be inefficient, and thus can limit the number of depressions by estimating the spring back data. Nakatani instead merely measures the gap or eccentricity and hammers the ground electrode a number of times (*see Fig. 7*). One of ordinary skill in the art would not have been motivated to modify Fujita to include the numerous hammerings of Nakatani, and the numerous hammerings would be unnecessary considering Fujita's ability to estimate spring back. Also, modifying Fujita with Nakatani would improperly modify Fujita's principle of operation so as to be based on the Nakatani measurements, which are not based on spring back, rather than the Fujita spring back measurements.

In view of the reasons stated above, Applicants submit that claim 7-12 and 14 are allowable over the combined teachings and suggestions of Fujita and Nakatani and respectfully request that the Examiner withdraw the rejection of claims 7-12 and 14.

Summary of Argument

In summary, Fujita does not anticipate the claims at least because it does not disclose widthwise adjustment or the particular method of widthwise bending between two pressing steps. While Nakatani teaches widthwise bending, it is not combinable with the Fujita because it would change Fujita's principle of operation. First, one of ordinary skill in the art would not have combined Fujita with Nakatani because Fujita uses data based on working an individual spark plug and Nakatani uses historical data. Also, Fujita discloses a limited number of depressions by estimating spring back, in contrast to Nakatani's numerous hammerings. Therefore, the claimed invention is patentable over both Fujita alone and the combined teachings of Fujita and Nakatani.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

AMENDMENT RESPONSE UNDER 37 C.F.R. § 1.111
U.S. Application No. 10/601,960

Q75539

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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Date: August 23, 2005